



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,657	12/28/2001	Sukanta Banerjee	42970-7C11	6168
26158 7590 06/09/2010 WOMBLE CARLYLE SANDRIDGE & RICE, PLLC ATTN: PATENT DOCKETING P.O. BOX 7037 ATLANTA, GA 30357-0037				
EXAMINER				
DO, PENSEE T				
ART UNIT		PAPER NUMBER		
1641				
MAIL DATE		DELIVERY MODE		
06/09/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/032,657

**Applicant(s)**

BANERJEE ET AL.

**Examiner**

Pensee T. Do

**Art Unit**

1641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 18-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date: \_\_\_\_\_

## **0DETAILED ACTION**

### ***Priority***

This application, 10032657, filed 12/28/2001 is a continuation in part of PCT/US01/20179, filed 06/21/2001 PCT/US01/20179 which claims priority from Provisional Application60213106, filed 06/21/2000.

### ***Amendment Entry & Claims Status***

The amendment filed on March 05, 2010 has been acknowledged and entered.

Claims 18-22 are pending and being examined.

### ***Claimed Invention***

18. (previously presented) A method of multiplex analysis of analytes in a solution, comprising:

providing a plurality of magnetically polarizable microparticles of two or more types wherein different types bear an optically distinguishable signature, and the different types display different capture moieties on their surfaces capable of binding to different analytes;

suspending the microparticles in a first solution containing, or suspected to contain analytes of interest, under conditions permitting the capture of analytes by the capture moieties, and wherein an optical signal is generated following such capture;

using a magnetic field to assemble the microparticles in a planar array on a designated section of a substrate, where said magnetic field is generated by coils or

magnets and is uniformly distributed over the surface of the substrate, and wherein the spacing between particles within the array can be varied by varying the strength of the magnetic field without moving the coils or magnets; and

imaging the optically distinguishable signatures associated with the microparticles and the optical signals, and correlating the optical signals with microparticles having particular optically distinguishable signatures to determine which analytes are bound by which capture moieties.

***Withdrawn Rejection(s)***

Rejection under 112, 1<sup>st</sup> paragraph in the previous office action is withdrawn herein.

***Maintained Rejection(s)***

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al. (US 7,115,884 filed on October 6, 1997) in view of Wang (US 6,013,531) and further in view of Farber (US 5,602,042).

Walt teaches a method of multiplex analysis of analytes in a solution, comprising providing a population of microspheres having a plurality of different subpopulations, each subpopulation comprises microspheres having distinct optical response signature (see col. 5, lines 5-30) or each microsphere is encoded with a fluorescent dye (see col. 11, lines 6-10) and has capture moieties coated thereon for binding to the target analyte (see tables II and III); the microspheres are assembled into an array and a sample is added to such array; illuminating the array; decoding the array by comparing the response of the entire sensor array to a known analyte or to a library of optical response signatures for its corresponding bead subpopulation type, where the optical response signature to various analytes has been previously measured and recorded. (see col. 5, lines 5-29). The beads and array images are recorded with a CCD frame transfer camera (see col. 17, lines 38-40).

However, Walt fails to teach using magnetic beads and applying a magnetic field at various strength to form an assembly of beads; Walt also fails to teach replacing the first solution with a second solution in claim 21.

Wang teaches fluorescent magnetic beads for use as markers in assay comprising a polymeric core coated evenly with a layer of polymer containing magnetically responsive metal oxide and a fluorescent dye or a combination of fluorescent dyes. (see col. 1, line 40-col. 2, line 9). Wang teaches using the magnetic particles in an assay by incubating the magnetic particles with a sample, magnetically separate them from the sample (first solution) and wash three times and resuspend in 30 ul of IBS (see example 35).

It would have been obvious to one of ordinary skills in the art to use fluorescent magnetic beads as those taught by Wang as particles in the method of Walt because the magnetic fluorescent particle in Walt can be used as a separation means and as a label at the same time and thus avoid the use of a second label molecule. Regarding claim 21, it is well known to one of ordinary skills in the art that after magnetic separation, a wash step must be performed to ensure all the non-bound molecules from the sample which might interfere with the detection are removed and a step of resuspending the magnetic particles bound with analytes in a buffer (second solution) is also a must in order to carry out the detection step as taught by Wang. It would have been obvious to one of ordinary skills in the art to replace the first solution (sample) with a second solution such as a buffer (IBS) as taught by Wang in the method of Walt to disperse the particles in such solution as a preparation for the detection step.

However, Walt and Wang fail to teach applying a various strength magnetic field to the magnetic beads to form an assembly of beads.

Farber teaches collecting particles such as cells tagged with magnetic beads against a solid surface using a magnet element which generates magnetic field at various strength to control the spatial distribution of the cells collected against the surface. Other configurations for spatially varying the magnetic field can use a distributed array of magnet elements that can be selectively activated and deactivated. (see col. 3, lines 59-65). Farber teaches a uniform distributed magnetic field by using the array of magnet elements which can be selectively activated and deactivated and the magnets array is not movable.

It would have been obvious to one of ordinary skills in the art to immobilize magnetic particles to a substrate using a magnetic field according to the method taught by Farber to assemble the magnetic particles into an array for use in the combined method of Walt and Wang so that analysis can be performed directly on a surface for large scale identification or separation.

### ***Response to Arguments***

Applicant's arguments filed March 05, 2010 have been fully considered but they are not persuasive.

Applicants argue that Farber does not teach the magnetic assembly step recited in claim 18 as now amended. Specifically, Farber does teach that the magnetic field is uniformly distributed over the substrate surface because Farber relies on magnetic posts extending from a magnet to a plate collection surface to vary the strength of the field across the collection surface. The position of these magnetic posts is fixed and therefore the final collection pattern of the particles is fixed. The physical locations of these magnet posts must be varied to provide arrays with different configurations. Applicants further argue that Farber fails to teach that the strength of the magnetic field may be varied to vary the spacing between the particles in the array. Applicants further submit that the magnet posts do not allow for control over the precise spacing between particles within each of these arrays.

This is not found persuasive because Farber also teaches "Other configurations for spatially varying the magnetic field can use a distributed array of magnet elements that can be selectively activated and deactivated. (see col. 3, lines 59-65)". The magnetic field of the individual magnets/coils is varied and therefore can adjust the inter-particle spacing. Furthermore, Farber teaches that the particles are uniformly collected against the substrate surface and therefore, the magnetic field must be uniformly distributed across the substrate in order to uniformly collect the magnetic particles.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pensee T. Do whose telephone number is 571-272-0819. The examiner can normally be reached on Monday-Friday, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Shibuya can be reached on 571-272-0806. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Pensee T. Do/  
Examiner, Art Unit 1641

/Jacob Cheu/  
Primary Examiner, Art Unit 1641